

ARMY ENGINEER DISTRICT NORFOLK VA

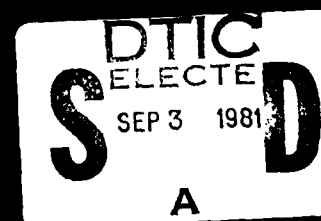
NATIONAL DAM SAFETY PROGRAM. COCKRAM MILL DAM (INVENTORY NUMBER--ETC(U)

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

DAN RIVER BASIN

NAME OF DAM: COCKRAM DAM
LOCATION: PATRICK COUNTY
INVENTORY NUMBER: VA 14105

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

DECEMBER 1980

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for public release and sale; its
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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam: Cockram Dam
State: Virginia
Location: Patrick County
USGS Quad Sheet: Meadows of Dam, Virginia
Stream: Dan River
Date of Inspection: 3 December 1980

Cockram Dam is a concrete gravity dam 150 feet long and 19.9 feet high. The dam is owned and maintained by Mr. S. H. Mitchell of Winston-Salem, North Carolina. The dam is classified as a small size dam with a significant hazard classification. The spillway consists concrete rectangular notch 1.4 feet deep and 85 feet long across the center portion of the dam. The reservoir is used for recreation and limited grist mill operation.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the 100 Year Flood. The spillway will pass 3 percent of the PMF or about 10 percent of the SDF without overtopping the dam. The SDF will overtop the dam by a maximum 2.86 feet, reach an average critical velocity of 8.0 feet per second (fps) and flow over the dam for 7 hours. The spillway is adjudged inadequate but not seriously inadequate. ←

The dam is in generally fair to good condition and appears stable under normal conditions. However, calculations based on field measurements made for this inspection revealed that the dam is on the verge of failure when the SDF (100 yr. storm) is applied.

Because of the unsafe condition of the dam during flooding, the dam is classified "unsafe non-emergency".

It is recommended that the owner take the following action:

a. Within three months from the date of notification to the governor of the Commonwealth of Virginia, engage the services of a professional consultant to determine the most advantageous method to eliminate the hazard posed by the dam.

b. Within 9 months of the notification to the Governor, the professional engineer's or consultant's report of appropriate remedial measures shall be complete. When the professional engineer's or consultant's report is completed, the owner should enter into an agreement with the Commonwealth of Virginia for a reasonable time frame in which recommended remedial measures will be complete.

c. Immediately develop an interim emergency operations plan and warning system. The emergency operation plan should require around-the-clock surveillance of the dam during periods of unusually heavy rainfall.

Submitted By:

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Acting Chief, Design Branch

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Douglas L. Haller

DOUGLAS L. HALLER
Colonel Corps of Engineers
District Engineer

Date: AUG 5 1981



CREST



DOWNSTREAM FACE

**OVERALL VIEWS OF
COCKRAM MILL DAM
3 DECEMBER 1980**

SECTION 1

PROJECT INFORMATION

1.1 GENERAL:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 1, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Cockram Dam is a concrete gravity structure about 150 feet long and 19.9 feet high. The base of the dam is 12.75 feet wide. See Plate 1. The dam is founded on rock. The crest of the concrete rectangular 85 foot long spillway is at elevation 2838.56 (ft. m.s.l.). The crest of the spillway is 3.75 feet wide and serves as a walkway. Hand rails are provided across the spillway on the upstream and downstream side of the spillway crest. A four foot wide rectangular notch, located near the center of the spillway, with invert elevation at 2837.06 is blocked by a piece of safety tread type metal plate.

Two gate stems, on the left nonoverflow section, connect to gates below the crest of the dam. One unknown sized gate controls the operation of the grist mill and the other gate, which is 24 inches wide and 36 inches high, can dewater the reservoir.

Once the reservoir rises above the crest of the dam, water will flow over the left abutment and through a paved parking lot and around the grist mill to discharge in the downstream channel.

1.2.2 Location: Cockram Dam is located on the Dan River approximately one mile east of the Meadows of Dan Community in Patrick, County.

1.2.3 Size Classification: The dam is classified as a small structure based on the guidelines in Reference 1 of Appendix IV.

1.2.4 Hazard Classification: The dam is located upstream of a grist mill, a U. S. Route 58 highway bridge, a home on the downstream side of the bridge and a cabin about a mile from the dam. There is a potential for destruction of property and disruption of traffic; therefore, a significant hazard classification is assigned to the dam as defined in Reference 1 of Appendix IV. The hazard classifications used to categorize dams are a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: Mr. S. H. Mitchell of Winston-Salem, North Carolina.

1.2.6 Purpose: Recreation and limited milling operation.

1.2.7 Design and Construction History: The dam was designed and constructed in the early 1900's. It is not known who designed or constructed the original dam. The height of the dam was increased by 1'-6" in 1964 when the mill and operating equipment were rehabilitated.

1.2.8 Normal Operational Procedures: Operation of the dam is automatic. Water flows automatically over the spillway as the reservoir rises. When the grist mill is in operation, the gate leading to the mill race is opened.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 6.41 square miles.

1.3.2 Discharge at Dam Site: Maximum flood - Unknown.

Pool level at top of dam

Spillway 485 cfs

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet msl	Reservoir			
		Area, acres	Capacity		Length feet
			Acre, feet	Watershed, inches	
Crest of Dam	2840.0	23.1	148	.43	3300
Spillway	2838.56	13.8	128	.37	2460
Streambed at Down- stream Toe of Dam	2820.1+	--	--	--	--

SECTION 2

ENGINEERING DATA

2.1 Design: No design data is available. Gates for controlling reservoir releases and flow to the millrace were replaced during rehabilitation of the mill in 1964. No records of previous inspections of the dam, if any, are available.

2.2 Construction Records: No construction records are available.

2.3 Evaluation: No design drawings construction records, or as built drawings were available to adequately assess the condition of the dam. All evaluations and assessments in this report are based on field observations and office analyses.

The cross section developed during this field inspection (See Plate 1) is adequate to perform a preliminary evaluation of the overflow section for overturning and sliding. If more detailed analysis is performed in the future, dimensions indicated on Plate 1 should be field verified. This cross section was developed below the wood walkway at the outlet near the right abutment.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 3 December 1980 inspection are recorded in Appendix III. At the time of the inspection, the pool level was approximately one inch above the spillway crest. The weather was fair and cold with a temperature in the 20's (F).

3.1.2 Dam: The dam is in generally good condition. Minor seepage of approximately 2 GPM was occurring where the millrace passes through the dam. Spalling and erosion of concrete on the downstream face is within tolerable limits. Minor seepage of less than 1 GPM is occurring at the gate for dewatering the reservoir, located near the left abutment. Rubble and concrete fill was placed at the left abutment apparently to prevent erosion of the left abutment due to overtopping of the dam.

Operating rods, wheels, and gears for manual operation of gates for the millrace and outlet to dewater the dam were in good condition. The steel box conduit carrying water to the mill immediately downstream of the dam is in good condition.

The downstream end of the mill building is being undermined by erosion. This erosion may be due to overtopping of the dam. When the dam is overtopped, water flows through the mill parking lot to the end of the mill building and into the Dan river downstream of the dam. Since past history of overtopping is unknown, erosion may have been caused by runoff. A tree on the upstream side of the dam on the left abutment appears to be contributing to downstream erosion. Water was observed flowing into a hole at the base of the tree. Undermining and failure of the asphalt driveway extending from the hole to the building indicate water flowing between the two areas.

The vertical and horizontal alignment of the dam appears normal and no sign of movement was observed.

The structure to abutment contact was tight at the right abutment with no sign of movement. The left abutment could not be observed due to rubble fill.

3.1.3 Foundation: The dam site is located in the Blue Ridge Mountain Physiographic Province of Virginia. The dam and surrounding area are shown in the northeast quarter of the U. S. Geological Survey Topographic Sheet, Meadows of Dam Quadrangle. (Appendix 1)

The rocks comprising this part of Virginia are known as metamorphic rocks and are of pre-Cambrian Age. Rocks outcropping and occurring around the dam consist of schist. Strike and dip observations taken on the schistosity of the rocks are N 19° W and 68° to the south respectively. Very little seepage was noted during the inspection. The potential for seepage does exist along the weathered schistosity planes that dip downstream. Seepage was noted flowing from 3 different areas in the left abutments. Flow rates were approximately 1 gal/min each.

3.2 Evaluation: There was no visual evidence of instability of the dam, foundation or abutments. Although erosion of the mill foundation should be repaired, this condition does not relate to safety of the dam and is beyond the scope of this report.

Undermining of the asphalt and erosion should be monitored. Severe erosion of the overburden material could result in reservoir water by passing the dam through the left abutment.

Seepage should not affect the integrity of the dam, however, it should be monitored.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool is 2838.56 ft. msl, which is the crest of the spillway. The reservoir provides recreation and limited milling operations. Water passes automatically over the spillway as the reservoir rises above elevation 2838.56. A gate of unknown size can be opened to service the grist mill. Another gate, which is 24 inches wide and 36 inches high, is located near the heel of the dam for dewatering of the reservoir.

4.2 Maintenance: There is no regular maintenance program for Cockram Dam. The owner has patched some concrete and provides some limited maintenance.

4.3 Warning System: At present time, there is no warning system or evacuation plan for Cockram Dam.

4.4 Evaluation: The dam does not require an elaborate operational and maintenance program. However, a regular maintenance program, complete with documentation, should be developed. An emergency operation and warning plan should be developed. It is recommended that a formal emergency procedure be prepared and furnished to all operating personnel. This should include:

- a. How to operate the dam during an emergency.
- b. Who to notify, including public officials, in case evacuation from the downstream area is necessary.

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: None were available.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: The maximum flow at the dam site is not known.

5.4 Flood Potential: The 1/2 PMF and PMF were developed and routed through the reservoir by use of the HEC-1DB computer program (Reference 2, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's Tc and R coefficient for the local drainage area were estimated from basin characteristics. The rainfall applied to the developed unit hydrograph was obtained from the U. S. Weather Bureau Publication (Reference 3, Appendix IV).

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water passes automatically over the spillway as the reservoir rises above the elevation 2838.56.

The storage curve was developed based on areas obtained from a U. S. Geological Survey Quadrangle Map. Survey data taken during the inspection was correlated to the Meadows of Dan, Virginia Quadrangle Map to help develop area-storage data. Rating curves for the spillway, nonoverflow section, parking lot area, and drawdown gate were developed. In routing hydrographs through the reservoir, it was assumed that the initial pool level was at the spillway crest (elevation 2838.56).

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance is shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

Item	Normal Flow	100 1/ Year	1/2 PMF	PMF 2/
Peak flow c.f.s.				
Inflow	6	4404	14220	28441
Outflow	6	4297	14087	27682
Maximum elevation ft. msl	2838.56	2842.86	2846.89	2850.99
Non-overflow section (el 2840.0)				
Depth of flow, ft	-	2.86	6.89	10.99
Duration, hrs	-	7.0	18.0	20.
Velocity, fps 3/	-	8.0	12.4	15.7
Tailwater elevation ft. msl.	2821 ₊	2829 ₊	2838 ₊	2848 ₊

1/ The 100 Year Flood has one chance in 100 of occurring in any given year.

2/ The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

3/ Critical Velocity

5.7 Reservoir Emptying Potential: A 24-inch wide by 36-inch high gate with an invert elevation of 2822.5 is available to dewater the reservoir. The low level outlet will permit a withdrawal of about 111 cfs with the reservoir at the crest of the spillway (elevation 2838.56) and essentially dewater the reservoir in approximately 1.5 days.

5.8 Evaluation: Based on the size (small) and hazard classification (significant) the recommended Spillway Design Flood is the 100 Year Flood to the 1/2 PMF. Because of the risk involved, the 100 Year Flood has been selected as the SDF. The spillway will pass 3 percent of the PMF or about 10 percent of the SDF without overtopping the crest dam. The SDF will overtop the dam by a maximum 2.86 feet, reach an average critical velocity of 8.0 feet per second (fps) and flow over the dam for 7 hours.

Conclusions pertain to present day conditions. The effect of future development on the hydrology has not been considered.

SECTION 6

DAM STABILITY

6.1 Stability Analysis: A preliminary stability analysis was performed based on field measurements taken below the wooden walkway at the gated outlet through the dam. A one-foot section of the dam was analyzed. The results of this analysis indicate that the dam is stable under normal conditions with reservoir level at the crest of the spillway. When the 100 year flood load is applied, however, the dam is on the verge of overturning. Results of the stability analysis are summarized in Table 6.1.

6.2 Foundation: Cockram Dam is founded on metamorphic bedrock. Inspection of both abutments shows the rock to be moderately weathered at the surface. Observed schistosity of the rocks have a steep dip and a northwest trend.

6.3 Evaluation: Since the preliminary stability analysis indicates that the dam is on the verge of overturning when the 100 year storm is applied, the dam is considered to be unsafe during flood conditions.

Settlement of the dam is not a problem because the foundation is bedrock. No indication of movement was noted along the dam alignment during the visual inspection. Sliding is critical where low angle weathered schistosity planes occur dipping in either an upstream or downstream direction. Observations in the field indicate that the schistosity planes dip downstream, too steeply, (68°) for sliding along rock planes to occur.

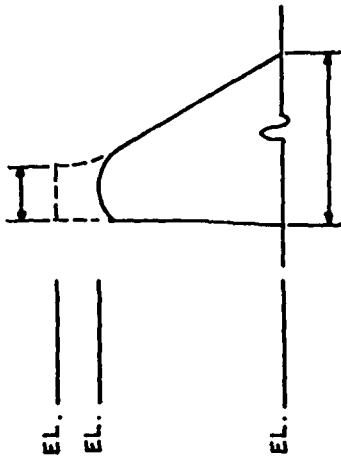
GRAVITY DAM DESIGN

STABILITY ANALYSIS

ANALYSIS DONE ON ✓ FULL SECTION PARTIAL SECTION
 LOCATION OF SECTION SPILLWAY/OVERFLOW SECTION OF DAM
 ANALYSIS PREPARED BY NORFOLK DISTRICT CORPS OF ENGINEERS

LOADING CASE	ELEV. HEAD WATER	ELEV. TAIL WATER	ΣV	ΣH	$\frac{\Sigma H}{\Sigma V}$	LOCATION RESULTANT FROM TOE	% BASE IN COMPRESSION	FACTOR SAFETY SLIDING	FOUNDATION PRESSURE	
									TOE	HEEL
1	2828.6	2822.6	14.2 K	10.5 K	0.74	3.8 FT.	89%	6.3	17 PSI	0
2	2842.9	2822.0	11.5 K	13.2 K	1.15	≈ 0 FT.	≈ 0%	4.9	-	-

LOADING CASE
 1. RESERVOIR @ SPILLWAY CREST
 2. SDF/100 YR.



PARTIAL SECTION

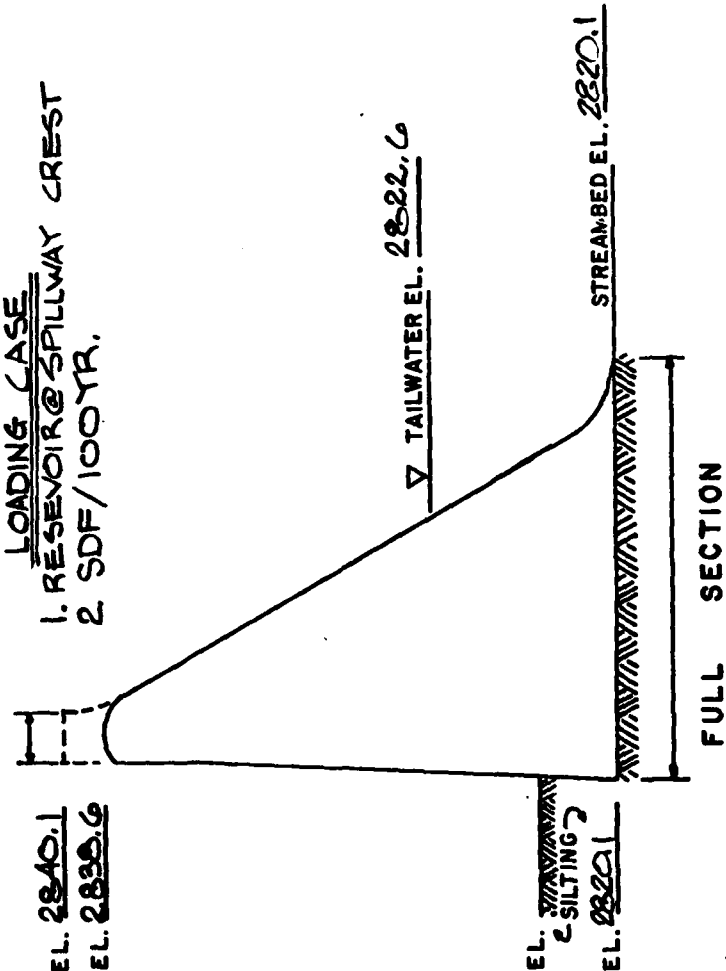


TABLE 6.1

SECTION 7

ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: Corps of Engineers guidelines indicate the appropriate Spillway Design Flood (SDF) for a small size and significant hazard dam is the 100 year flood. The spillway will pass 10 percent of the SDF without overtopping the dam. The SDF will overtop the non-overflow section of the dam by 2.9 feet. The spillway is adjudged as inadequate, but not seriously inadequate.

There were no engineering data available for use in preparing this report. The dam and appurtenant structures were in generally good overall condition at the time of the inspection. Deficiencies discovered during the field inspection and office analyses will require further investigation and remedial treatment.

Cockram Mill Dam is in good condition. Periodic overtopping of the structure, which has probably occurred, has not been detrimental to the dam, however, the foundation of the mill downstream has been seriously undermined. This condition may have been caused by runoff. Overtopping records are not available. If repairs to the mill are not accomplished soon, the mill may be seriously damaged by future flooding.

A preliminary stability analysis of the spillway section based on field measurements at the gated outlet was performed. See Table 6.1. This analysis indicates that during flood conditions of the 100 year storm the dam is on the verge of failure. For this reason, the dam has been assessed as "unsafe non-emergency".

7.2 Recommended Remedial Measures:

7.2.1 It is recommended that within three months from the date of notification to the Governor of the Commonwealth of Virginia, the owner engage the services of a consultant to determine the most advantageous method to eliminate the hazard posed by the dam. Studies should be performed in accordance with Reference 1, Appendix IV, Recommended Guidelines for Safety Inspection of Dams.

The first priority for further study should be to perform a stability analysis for the dam as an entire unit. The analysis for this report was based on a one foot wide section and neglects any increase in dam base width due to the slight observed arch along the crest of the dam.

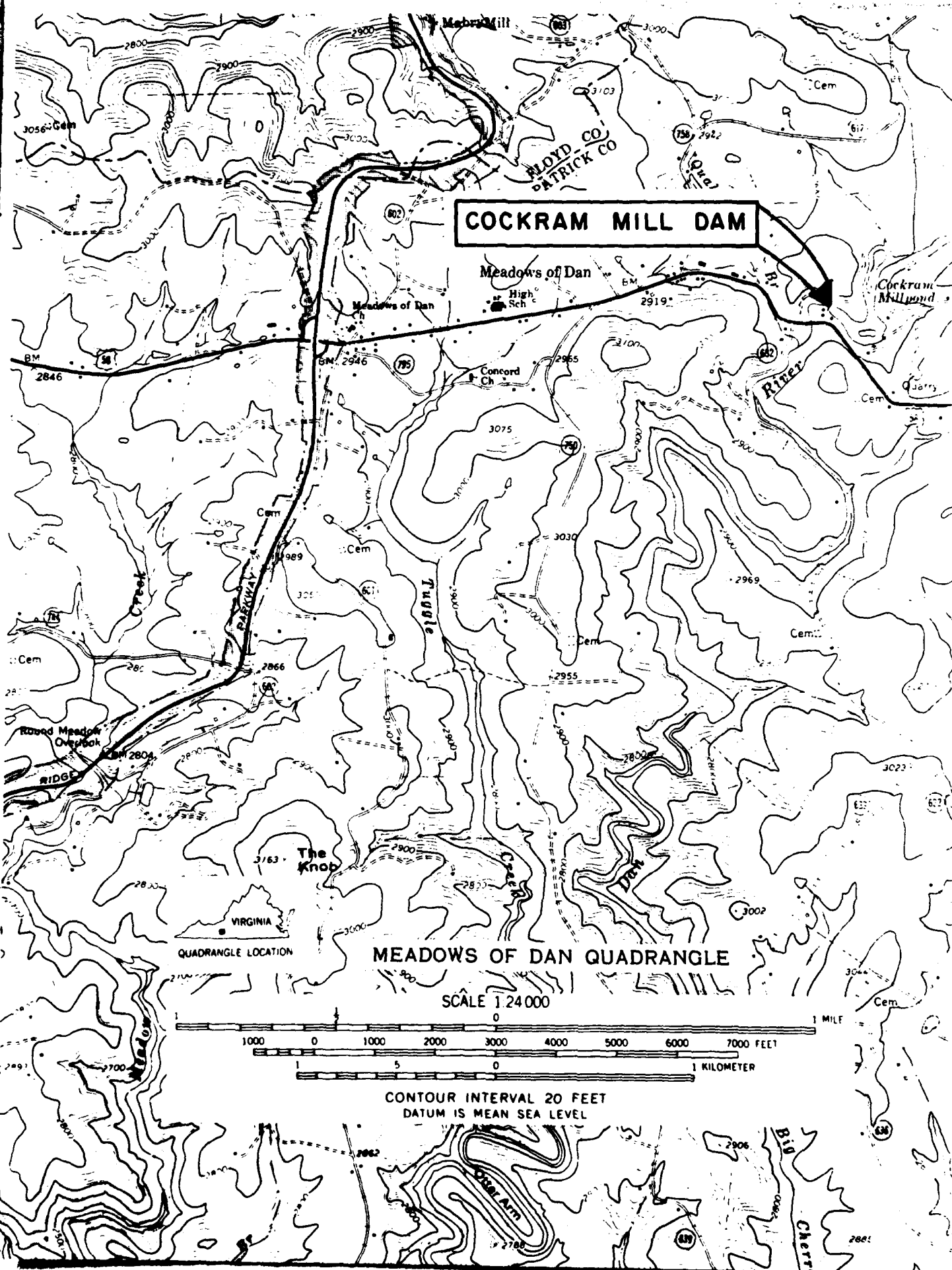
If these calculations indicate instability under the spillway design flood (SDF), the SDF appropriate for this project should be determined by more sophisticated methods and procedures. The study should then make a detailed evaluation of the downstream flood plain as it relates to the hazard potential.

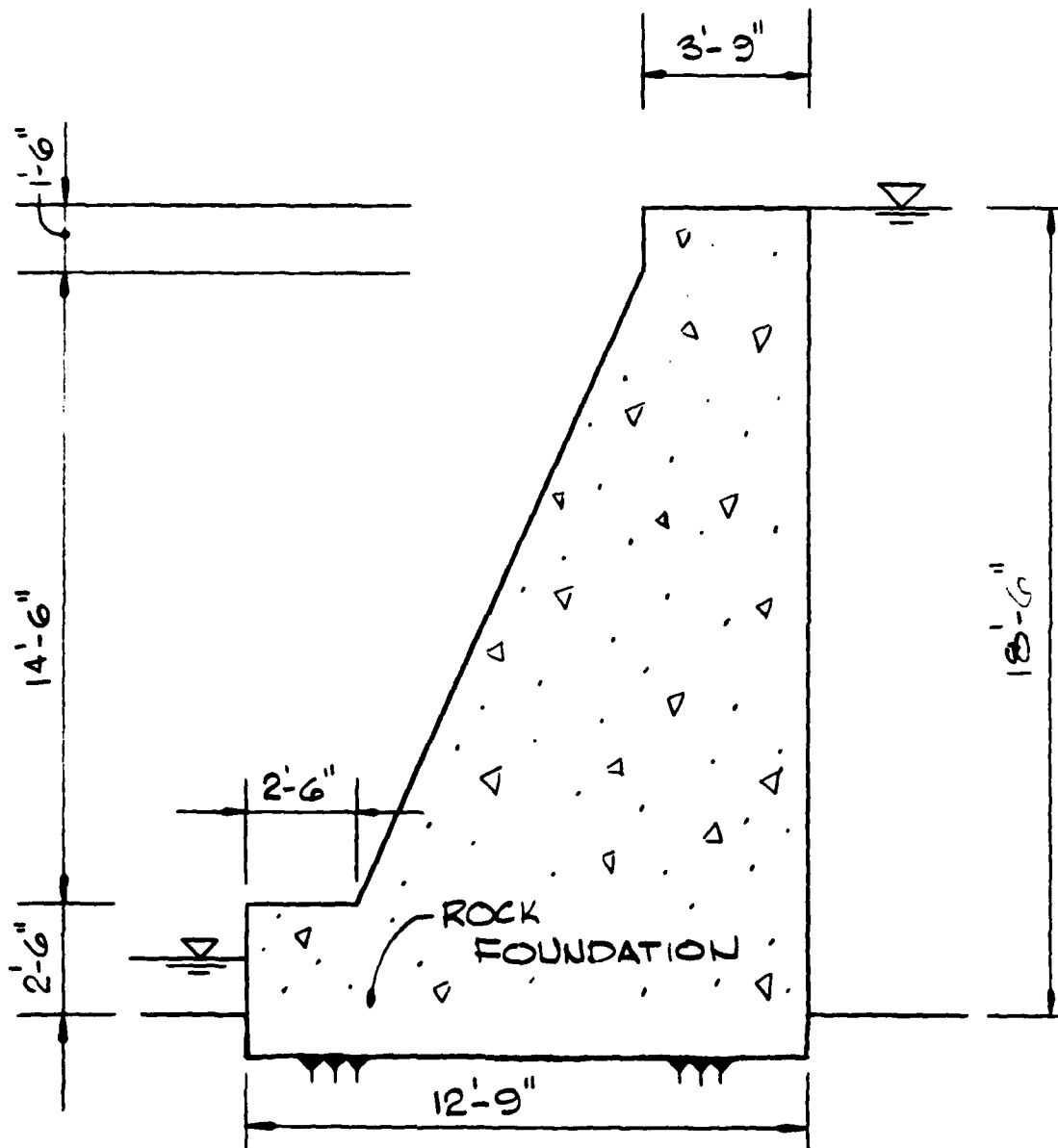
If further study still indicates unsafe conditions, remedial measures to be considered include modifications to the dam, floodplain and/or any other method of eliminating the danger imposed by the project.

7.2.3 Within 9 months of the notification to the Governor, the consultant's report of appropriate remedial measures shall be complete. At that time, the owner should enter into agreement with the Commonwealth of Virginia for a reasonable time frame in which recommended remedial measures will be completed. In the interim, a detailed emergency operation plan and warning system should be promptly developed. The emergency operation plan should include the following:

- a. Around-the-clock surveillance of the dam during periods of unusually heavy rainfall.
- b. How to operate the dam during an emergency.
- c. Who to notify, including public officials, in case evacuation of the downstream area is necessary.

APPENDIX I
MAPS AND DRAWINGS





3 DEC. 1980

PLATE 1

APPENDIX II

PHOTOGRAPHS

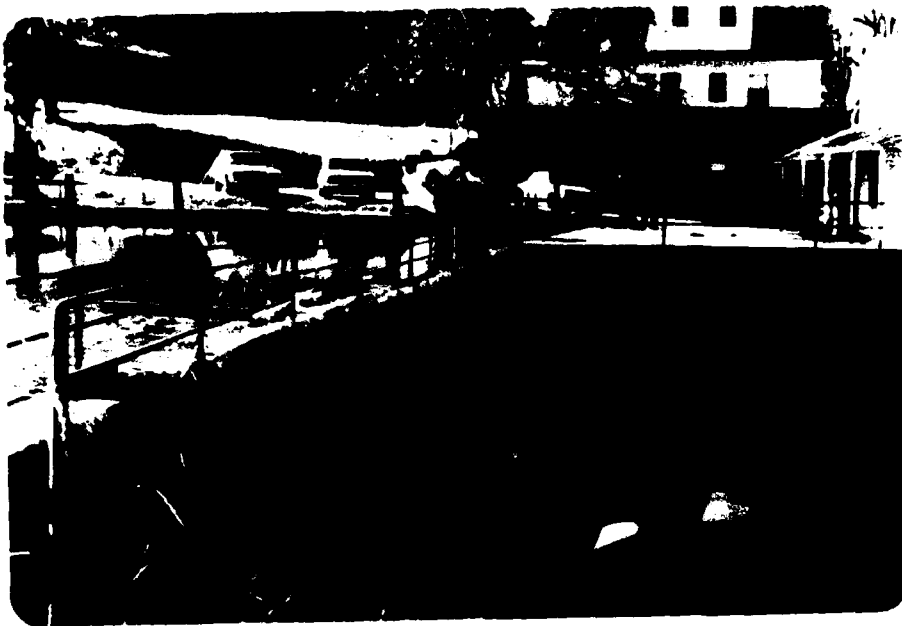


PHOTO #1 FACE OF DAM



PHOTO #2 CREST & SLUICeway OPERATOR

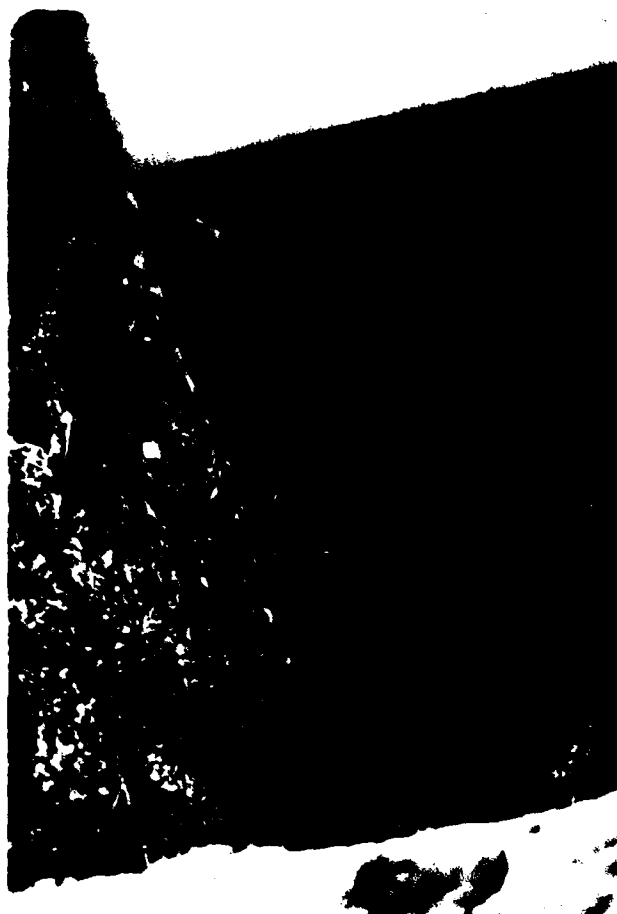


PHOTO #3
TYPICAL OF CONDITION
OF CONCRETE (RECTANGULAR
STRUCTURE ABOVE IS
METAL SLUICeway FOR
WATER TO MILL



PHOTO #4 CONTACT LT. ABUTMENT



PHOTO #5
CUTOUT THRU DAM
FOR RESERVOIR
DRAINING



PHOTO #6 DOWNSTREAM AREA

APPENDIX III
FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Dam: Cockram Dam City: Patrick State: Virginia Coordinates: Lat. 3644.2
Long. 8022.9

Date of Inspection: 3 Dec 80 Weather: Clear, Cold Temperature: 30-35o F.

Pool Elevation at Time of Inspection: 2838.56 ft msl Tailwater at Time of Inspection: 2821+ ft msl

Inspection Personnel:

M. Stith, COE
J. Swean, COE
L. Jones, COE
D. Pezza, COE

B. Taran, COE
J. Robinson, COE
H. Gildea, SWCB

D. Bushman, SWCB
L. Musselwhite
Mr. S. H. Mitchell, Owner

Robinson, Stith, Swean Recorders

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE/LEAKAGE	Minor seepage of approximately 2GPM is occurring around the box steel millrace. Since water was flowing over the spillway, seepage through the dam could not be observed.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Left Abutment - The downstream face has been stabilized with stone rubble and concrete fill.	None
DRAINS	None observed.	
WATER PASSAGES	The 24" x 37" outlet near the left abutment is in good condition with only minor seepage occurring here.	
FOUNDATION		

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Some minor spalling and surface erosion has occurred. No major deficiencies were noted.	
STRUCTURAL CRACKING	None was observed.	
VERTICAL AND HORIZONTAL ALIGNMENT	No sign of movement was observed.	
MONOLITH JOINTS (VERTICAL)	None observed.	
CONSTRUCTION JOINTS	None observed.	

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	The concrete weir is in good condition. A fallen leaning tree against the downstream side of the spillway. A four-foot wide open section with an invert elevation of 2837.06, blocked by a piece of plywood, can be used to lower the reservoir 1.5 feet. Hand rails are placed on the upstream and downstream edge of the spillway for support when walking across the spillway.	None
DISCHARGE CHANNEL	The discharge channel is in natural rock and as wide as the spillway (85 feet). Some small debris is located around the toe of the dam.	None
EMERGENCY GATE	None	
GATES AND OPERATION EQUIPMENT	The grist mill operation is shut down with no operation of any gates.	None

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATION
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No instrumentation was observed.

RESERVOIR

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are mild to steep with mostly wooded terrain.	None
SEDIMENTATION	The inspection team is unable to evaluate sediment in the reservoir.	None

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is in natural rock. The channel remains about 80 feet wide and 15 feet deep from the dam to at least one mile downstream. There is a concrete bridge across a road just below the dam that could obstruct large flows through the dam.	None
SLOPES	The slopes are mild to steep and mostly wooded.	None
APPROXIMATE NO. OF HOMES AND POPULATION	One house is located about 1000 feet downstream on the downstream side of the highway bridge. A cabin is located about one mile downstream in the flood plain.	None

APPENDIX IV

REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Office of the Chief of Engineers, Department of the Army, Washington, D. C.
2. HEC-1DB Flood Hydrograph Package, (Hydrologic Engineering Center, U. S. Army Corps of Engineers, September 1978.)
3. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, (U. S. Weather Bureau, June 1978).
4. "Rainfall Frequency Atlas of the United States", Technical Paper No. 40, (U.S. Weather Bureau, May 1961).